

"REPORT ON PICTOU CATTLE DISEASE INVESTIGATIONS.
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McGILL COLLEGE,
MONTREAL, 31st December, 1882.

SIR,—Pursuant to instructions received from the Department of Agriculture, I proceeded to Pictou in September last, and in conjunction with Dr. William McEachran, the resident Inspector, made such observations upon the disease as the limited time at my disposal permitted. Unfortunately for my purpose I arrived when there were very few animals sick, but we were able to institute certain experiments, the results of which have a bearing on some points in connection with the disease.

My personal experience and the record of experiments are as follows :

1 Cow, aged 4, belonging to Mr. Thomas Millar, Millbank Farm, Pictou, who says he lost one animal last spring. Has a herd of seven, all of which were taken to quarantine. Animal calved in June; took the bull on the 22nd; appeared quite well until September 9th, when the disease began by a copious diarrhoea, for which she was given fish oil and soot. Seen by Dr. Wm. McEachran on the 13th, temperature $101\frac{2}{3}^{\circ}$; was standing up; was scouring and presented the marked features of the disease—staring, brilliant eyes, rough coat, and general look of sickness, and peculiar taste of the milk. When seen in the afternoon, temperature 101° , dulness in lower abdominal region; respirations and pulse slightly increased, latter 80, thready.

On Thursday 15th, found her lying down and so weak that she could not rise up, was evidently sinking fast. Respiration 60.

Killed by slight blow on head and bleeding. Blood of good colour, not black or tarry. *Skin*, rough hair; in subcutaneous tissue about mammary region a few ecchymoses. *Abdomen*, several gallons of brownish-yellow fluid flowed away—a little turbid, but with no shreds—general peritoneal surface smooth. *Omentum*, thickened by an infiltration of the tissue, and in the vicinity of the vessels there were numerous small ecchymoses. On stripping off this membrane the folds and grooves about the stomach presented a swollen appearance from the gelatinous infiltration. At one end of the many plies there was a clot in the peritoneal tissue the size of an egg.

Paunch contained a large mass of food mixed with a good deal of liquid. Membrane presented no special change; towards the reticulum was a patch in which thirty or forty amphistomes were attached.

Reticulum normal. *Manyplies* large; the food between the layers dry and caked, particularly towards the periphery.

Rennet contained food. The mucosa in its entire extent was elevated and formed irregular folds. On section this was found to be due to the uniform infiltration of the submucosa with a gelatinous substance which formed a layer from one half to one and a half inches in depth, quite clear; vessels not injected. The mucosa itself seemed pale and turbid, not the normal tint. The muscularis showed no change; the peritoneum was smooth, but in the folds much infiltrated. After section, the serum partially drained out of the submucosa. This condition was confined to the fourth stomach and did not extend to the duodenum.

Small intestines contained dark brown liquid faeces; mucous membrane pale, but presented no special change. Muscularis and serosa normal.

Large bowel contained a quantity of brownish-green soft faeces, which became more consistent towards the rectum. *Mesentery* was everywhere thickened and infiltrated with serum, though not to the extent of the omentum. It was congested and presented innumerable ecchymoses.

Spleen thin and small, on section natural looking.

Liver a little pale, evidently fatty; gall bladder contained a normal quantity of bile. Vessels and duct slit open and found healthy.

Pancreas looked normal.

Kidneys of good colour and consistence; no congestion. Bladder full of urine.

Uterus contained a two months' foetus.

Heart contained but little blood; valves healthy, numerous subendocardial ecchymoses in the left ventricle. Muscle substance pale.

Lungs crepitant, with a few scattered patches of collapse; bronchi free.

Aorta and thoracic duct slit open; no change.

Brain presented sub-pial extravasation in the left hemisphere. Substance healthy.

Microscopical examination conducted two and a half hours after the *post mortem*.

Blood, from left auricle had clotted; corpuscles crenated but natural looking; no micro-organisms.

Peritoneal fluid contained leucocytes and red corpuscles, with a few small, highly refractile bodies visible with No. 9 Hartnack.

Spleen tissue normal. Thickened *mesentery* presented increase in interstitial leucocytes, and many of the fixed corpuscles appear swollen.

Mesenteric glands a little swollen; cells normal.

Liver cells very fatty; no further change.

Stomach.—The glands of the mucosa in teased specimens were very distinct, easily isolated, and the epithelial elements very plain; protoplasm granular. The submucous infiltration consisted of the separated and swollen connective tissue fibres with occasional leucocytes.

Intestinal fluid, when left to stand in conical glass separated into a small layer of brown sediment and a turbid brownish fluid. A drop of this under the microscope revealed the existence of many micro-organisms, none of which were motile of form; present there were (1) small round bodies, micrococci; (2) ovoid bacteria, either single or in chains of two, three or four; very many of these contain at one end a small, bright, highly refractile body (a spore); (3) rod shaped Bacilli, tolerably abundant, either in single bits or double, the joint being somewhat bent. They resemble clearly the *B. subtilis* or *anthracis*.

Food particles, &c., were in abundance, but nothing else of special note.

II. Quarantine animal, No. 59.—Steer, aged about fifteen months. Belonged to K. Forbes, of Green Hill, Pic. Co. Entered into quarantine 21st August, apparently healthy. Had come from a farm on which, in the summer of 1881, seven head were lost. In the spring of 1882, five head

were lost, one of which had been slaughtered by order of Inspector. This animal was seen by Dr. W. McEachran last summer, and was then ill; she seemed to recover, calved, and after it did not thrive and got weaker; was ordered to be killed. An undoubted case.

On August 27th, copious diarrhoea; in evening, very weak and staggering; was placed in hospital, and ordered to be fed and treated with Tr. Ferri Mur. and Pot. Iodii. 3i; Tr. Gent. Co. 3g., aqua add 0g m. et n.

For the first three or four days the animal fell away rapidly, got very emaciated, did not eat; temperature, taken daily, ranged from 103° to 104°. Then began to pick up, and bowels improved, though the temperature kept up. Medicines stopped on 9th September; faeces consistent; appetite good, though looked unthrifty; hair rough.

From 13th, temperature was as follows: 13th, E. 103½°; 14th, M., 102¾°; E., 102¾°; 15th, M., 102°; E., 102¾°; 16th, M., 102¾°; E., 102¾°; 17th, M., 102¾°; E., 102¾°.

18th, killed by concussion and bleeding.

Abdomen.—Small quantity of peritoneal fluid, omentum natural; no subperitoneal effusion; no gelatinous infiltration. Lymph glands at back of abdomen deeply injected.

Stomach.—4th contains food; normal looking; digestion going on; membrane clear, no infiltration. 3rd, normal. 2nd presents no change.

Paunch.—Full of food; looks quite healthy; about two dozen amphistomes in usual position.

Spleen.—Firm and normal.

Intestines slit up; a few solitary glands look prominent; otherwise no change.

In cæcum.—Half a dozen whip worms; faeces normal.

Kidneys.—Healthy.

Liver.—Normal; nothing in portal vessels or in bile ducts; gall bladder moderately full.

Thoracic viscera perfectly normal.

Thoracic duct and aorta healthy.

III. No. 23.—Heifer, well bred; aged fifteen months; came from a farm which has been badly affected; three lost this season, among which was her mother; entered quarantine on 14th of August; about 22nd August became unthrifty; did not look well; hair rough; looked thin; had staring eye; appetite failed; did not ruminate; copious diarrhoea and very weak; temperature for a week ranged about 104°; she got the Ferrum and Pot Iodid; put in hospital after first week, temperature 102°; medicines stopped on 9th September; faeces consistent; she appeared

hide bound and rough (she was very sleek); temperature range from 13th, E., $102\frac{2}{5}^{\circ}$; 14th, M., $105\frac{2}{5}^{\circ}$; E., $102\frac{3}{5}^{\circ}$; 15th, M., $102\frac{3}{5}^{\circ}$; E. do.; 16th, M., $102\frac{3}{5}^{\circ}$; E., 103° ; 17th, M., 103° ; E., 103° . 18th, killed by concussion and bleeding; external appearance normal; in abdomen no infiltration of omentum or peritoneum; no change in any of the abdominal viscera; the paunch had about one dozen amphistomes; no change in any of the thoracic organs.

IV. Quarantine animal, No. 76.—Cow, aged about seven, belonging to Louchlin McInnes; there had never been any disease on his farm; was placed on the 14th of August with the suspected cattle (his farm was the quarantine); on the 20th, Dr. McEachran's attention was called to her as being loose in the bowels; not very copious; she was allowed to run for another day when she was thought ill enough to put in hospital; the milk almost ceased; was treated in same way; her hair was rough and eye bright; abdomen very large; temperature for the first week, 102° , 104° ; medicines seemed to give her great relief; on third day much better; medicines stopped 9th September; seemed better; coat a little rough; fed well; on 19th killed; abdomen greatly distended; paunch very large; about a pint of peritoneal fluid; paunch full of large mass of half macerated food; membrane normal; no amphistomes; other viscera normal; no trace of any affection in abdominal or thoracic organs.

Quarantine animal 62.—Cow, aged three, from the farm of Hugh Harris, of the town Gut. He had lost two this season; one died and one destroyed by order of Inspector. Entered quarantine on 27th of August, calved on 22nd August. On September 3rd was observed to be unthrifty; loose, coat staining, appetite had failed, was ordered to hospital, where she was given only wheat-heads. She seemed to improve, diarrhoea was only for three days, not very bad. Temperature 104° when she went to hospital and continued at that for three days. No change noticed, but looked out of sorts, coat rough, eyes bright.

Killed 19th September by concussion.

Paunch full, omentum clear, no infiltration, no affection of stomach or intestines, perfectly clear and natural looking. Amphistomes in numbers in usual site; half a dozen sclerostomes in small bowel.

Heart and lungs normal.

Cow the property of William Wylie. A well marked case; ill about ten days. Killed by concussion.

Post mortem lesions identical with those of case 1 (cow of Thomas Millar's).

Experiment No. 1.—With peritoneal fluid from Millar's cow (case 1) inoculated a calf (No. 74) four months old, by incision and put the clot of the serum beneath the skin.

On the 16th, 17th, and 18th no change; no fever; Dr. McEachran reports that the animal was kept under continuous observation until 2nd December. There was some elevation of temperature during the first week but no sign of the disease appeared; at the *post mortem* (December 2nd) there were no special lesions.

II. 15th September. No. 75. Calf, injected hypodermically half drachm of intestinal fluid from Mr. Millar's cow.

16th, 17th, and 18th.—No special change; no fever.

Dr. McEachran reports that the animal was kept under continuous observation until 2nd December; the temperature and pulse taken night and morning. There was slight septic fever for a few days, but it passed off, and the animal appeared in its usual health. No changes noticed at the *post mortem*.

III. 15th September, 1882. Sheep inoculated with intestinal fluid from Mr. Millar's cow.

16th, 17th, and 18th.—No change.

Dr. McEachran reports that a careful record was also kept of this animal for over two months and a half, but it showed no signs of disease beyond slight febrile disturbance a few days after the inoculation.

IV. 19th September, 1881.—Two year old steer was fed on "Ragwort," or "Stinking Willie," about a half of a pound daily, chopped up and mixed with bran as a mash.

V. A two-year-old heifer was treated in the same way. Dr. McEachran reports that the feeding was continued until 2nd December. No appearance of the disease during this period, and a *post mortem* on the heifer showed the organs to be in a perfectly healthy condition.

VI. 20th September, 1882.—A heifer two years old, was placed in the shed, on the property of Mr. Thomas Millar, in which the cow, reported as case 1, was ill for some days, and thoroughly saturated the straw and earth with her excreta. Kept until 6th December; remained in good health until date, when she was sent to the quarantine.

General considerations.—In spite of the numerous investigations which have been made, we are still in the dark as to the true nature of this affection. In justice, however, to the gentlemen who have pursued these inquiries, it must be remarked that while the measures taken have been admirably adapted to the eradication of the disease, they have not

been altogether favourable to its scientific investigation. It would have been better if an experimental station had been established at first, and those data obtained which are absolutely essential before a positive opinion can be given as to nature of any disease.

It would appear tolerably certain that the affection is not due to any poisonous substances in the food or drink, but to the existence of some special—in this instance, unknown—contagion which has got established in the region, and find there suitable conditions for its maintenance and development. Experiments IV and V effectually dispose of the popular notion that it is due to the *Senecio Jacobea*, or Ragwort.

To the questions is it inoculable? is it infectious? is it contagious? we can give but imperfect answers, based on insufficient evidence. Experiments I and II, appear to show that the disease is not directly inoculable, at least with the peritoneal fluid or the characteristic intestinal contents, but the animals used were young and may not have been susceptible, so that further experiments alone can determine this point. Neither the infectious nor contagious nature has been satisfactorily, *i.e.* scientifically, demonstrated, though in the establishment of quarantine and in the measures taken for stamping out the affection it was very properly assumed to be both. That it is infectious appears probable from the way in which it has broken out in successive years in certain farms and not on others, even adjacent; as if special localities had become infected. The erection of new sheds and the thorough disinfection of yards have eradicated the disease on some farms. Such facts can be best explained on the supposition that the poison attaches itself, *i.e.* infects localities which have been contaminated by sick animals, and from time to time, as suitable conditions arise, fresh outbreaks occur. Indeed, the way in which this disease has haunted Pictou County, and the way in which sporadic cases or groups of them have appeared at intervals and tend to recur on farms where it once has got a foothold, reminds one strongly of the records of anthrax districts in some countries. Year after year in such regions cases occur, varying in intensity and in the number of animals affected, not wide-spread enough to destroy all the cattle, but constantly kept alive and entailing great loss on the farmers.

Experiment VI, in which a healthy beast was in a highly infected shed and remained well for over two and a half months is against a high degree of infection, but it may be

that the period of incubation extends over several months, or the animal was one not susceptible to the poison. This is a circumstance to be borne in mind, and is one amply illustrated in the history of many diseases even of a very catching kind. It is rare, except in very severe epizootics, for all the animals in a herd to be affected; many escape, and so in this Pictou disease the susceptibility has been limited. Thus in Professor McEachran's Report (1881), it is stated that during the season only nine of the 200 cows of the town of Pictou, and only two of the 200 animals of New Glasgow died of the disease, yet these animals freely intermingled and frequented the same pastures.

The contagiousness is still more doubtful. In the town cattle, the sick and healthy animals have been allowed to roam together, and yet, as the figures just quoted show, comparatively few caught the disease. Some of the farmers I spoke with were very positive about the contagious nature, but the facts already in previous Reports show that it must be slight and not a marked feature. The slow way in which it has spread is also against a high degree of contagion.

I know of but one affection to which the disease has certain points of resemblance, and that is the intestinal form of anthrax *Mycosis intestinalis*. In this remarkable disease the digestive canal is chiefly involved, and there are oedematous, infiltrations, hæmorrhages and peritoneal effusions, just as occur in the Pictou cattle, but the characteristic *bacilli* are found not only in the intestine, but in the mesenteric blood vessels, and in the glands. In Millar's cow (Case 1) *bacilli*, not to be distinguished from those of anthrax, were tolerably abundant in the intestinal contents, and in the mucosa, but none were found in submucous infiltrations, in the blood vessels or in the swollen mesenteric glands. In the other typical case (VI) the *post mortem* took place on the day I had to leave, and I had not an opportunity of examining the intestinal contents when fresh.

I have the honour to be, Sir,

Your obedient servant,

WM. OSLER.

The Honorable

The Minister of Agriculture,
Ottawa."